PIKE TECHNOLOGIES
Spectroscopic Creativity

Installation and User Guide

XY Autosampler Diffuse Reflectance and Transmission Accessory

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Introduction

The X, Y Autosampler is designed around standard 96-well microplate architecture. It features an X, Y stage with both axes driven by precision servo motor/leadscrew combinations and is available in four different configurations:

- Mid-IR Diffuse Reflectance
- Mid-IR Diffuse Reflectance/Transmission
- NIR Diffuse Reflectance
- NIR Diffuse Reflectance/Transmission

The transmission version has an IR transparent tray and a built-in DTGS detector mounted inside the accessory.

Table 1. Specifications

Optics	
Sample spot size	3X beam de-magnification from spectrometer sample focus
Angle of Incidence	30°
Mechanical Specifications	
Repeatability	+/- 5 µm
Resolution	1 µm
Mechanical Range of Motion	63 mm x 250 mm (in unloaded position)
Sampling Range of Travel	63 mm x 99 mm
Minimum Run Time	56 seconds for 96-well plate (actual time is spectrometer and application dependent)
Computer Interface	USB
Dimensions (W x D x H)	5.55 x 13.2 x 6.25" (including micrometer)
Weight	10 lbs

The optical design is based on a precision ellipsoidal reflector and the size of the spot illuminated at the sample is approximately 2 mm (the final beam size is spectrometer dependent).

Two types of sampling plates are offered in the 96-well configuration. The **reflectance sampling plate** contains 96 wells in an 85 mm x 125 mm rectangular grid. These wells are 7 mm diameter and 5 mm deep, and may be used to hold polymer beads, powders or liquid samples. The **transmission sampling plate** implements the above geometrical configuration but uses a thin IR transmitting plate to hold the samples.

The X, Y Autosampler is controlled by PIKE Technologies' AutoPRO™ software which can be integrated with most commercial FTIR and NIR software packages.

Unpacking Your Accessory

In order for you to quickly verify receipt of your accessory, we have included a packing list. Please inspect the package carefully. Contact PIKE Technologies if any discrepancies are noticed.

Packing List

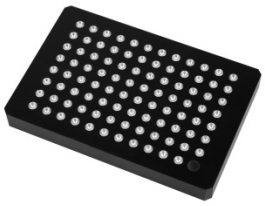
User Manual
PN 350-0047000
Quantity 1

AutoPRO6 Manual and Software
PN 350-000071
Quantity 1

X, Y Autosampler
PN 047-XXXX
Quantity 1

Purge Tubing Kit
PN 025-3055
Quantity 1

96-Well Diffuse Reflectance
Sampling Plate
PN 073-9110
Quantity 1



96-Well Transmission
Sampling Plate
(transmittance configuration only)
PN 073-9130
Quantity 1

Power Supply
with Power Line Cord
Quantity 1

15-Pin Detector Cable
Quantity 1

USB Cable
Quantity 1

Optical Description

The optical system of the X, Y Autosampler is symmetrical with identical mirrors being used for the optical path from the spectrometer interferometer to the sample and the sample to the spectrometer detector. One pair of flat mirrors and an ellipsoidal mirror are used in each path. A cut away view of one side of the optical path is shown below.

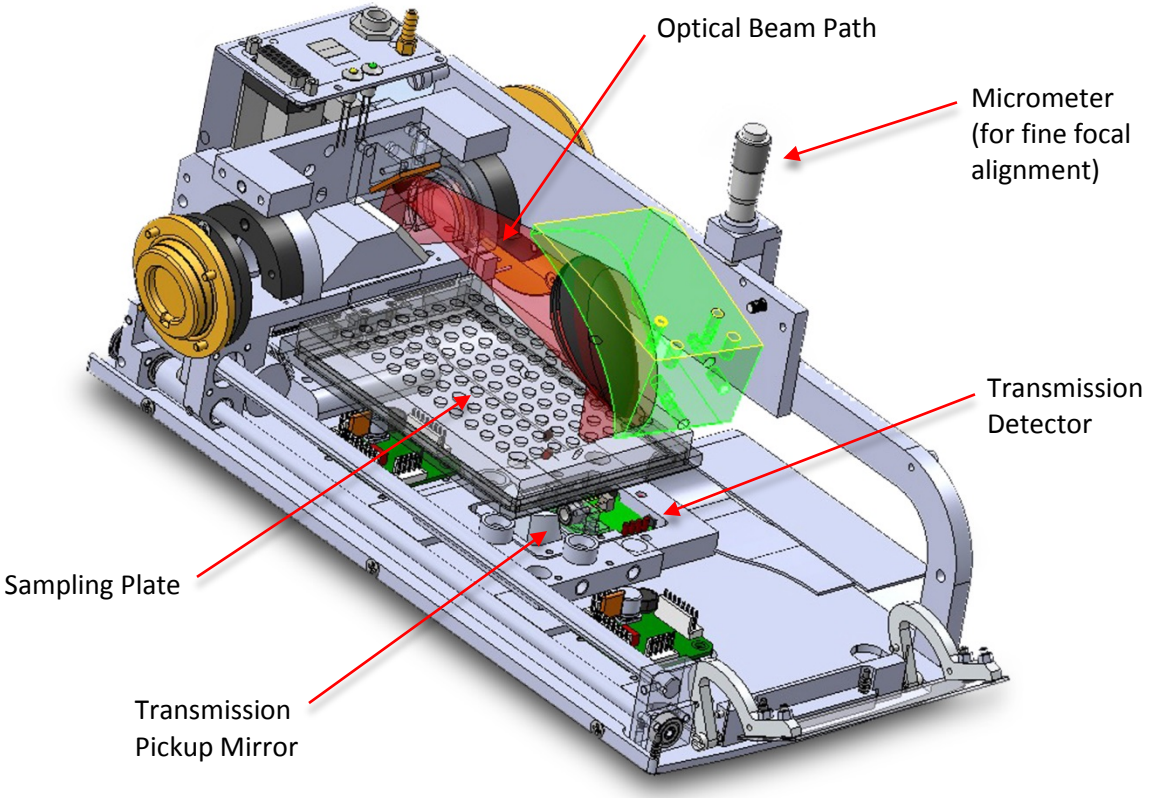


Figure 1. Optical cutaway view

The optical paths are symmetrical down the centerline of the accessory. To change between reflectance mode and transmission mode you only need to change the sampling plate and the detector selection in the spectrometer software package. The micrometer can be used to make fine focal adjustments to optimize throughput depending on the sample.

The two pairs of flat mirrors redirect the incoming and outgoing beams to and from the ellipsoid mirrors located near the front of the accessory. The ellipsoid is a large solid angle monolithic mirror which condenses the beam onto the sample with a power of approximately 3 times with an Angle of Incidence (AOI) striking the sample at 30°.

Note that the size of the beam in the spectrometer is dependent on manufacturer. Refer to your spectrometer user-guide to determine the actual beam size.

Installation

The accessory is mounted on the spectrometer sample compartment baseplate and will fit in the sample compartment of your instrument without any additional adjustments.

Mounting of the Accessory in the Spectrometer Sample Compartment

1. Remove any sample holder present in the sample compartment.

2. Scan a background with your FTIR software and save to disk. This single beam spectrum can be used to verify the performance of the system.

3. Place the accessory in the sample compartment. Using a 3/32” wrench, loosen the screws on the two purge seal tubes on the sides of the accessory. Push the tubes toward the side walls of the spectrometer. This will seal the accessory and ease future placement of the accessory in the sample compartment.

4. Secure the accessory baseplate to the spectrometer sample compartment floor with screws. Please note that some instruments feature plate lock-down mechanisms which do not require use of screws.

Purge

When used with sealed spectrometers the accessory can be purged by connecting a dedicated dry air or nitrogen line to the top panel (Figure 2.). For purgeable spectrometers with (with no sample compartment windows) the X, Y Autosampler will be automatically purged by the air/nitrogen flowing though the instrument. In the latter case, make sure that purge tubes on the accessory sides are placed tight against the sample compartment walls.

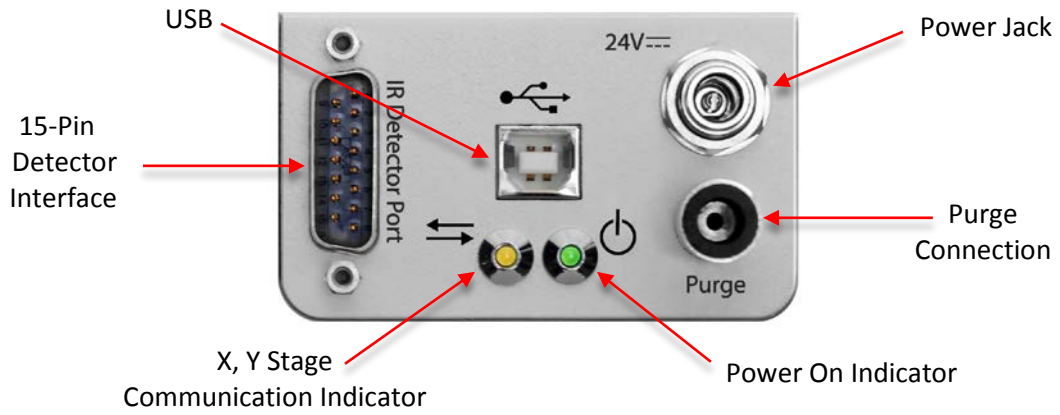


Figure 2. Connector panel located on the top cover of the X, Y Autosampler

Connecting the DTGS or InGaAs Detector (Transmission Version Only)

Before performing this step please ensure that the spectrometer power is off.

Refer to Figure 2 on the previous page to locate the following connectors.

1. Locate the 15-pin connector on top of the accessory cover.

2. Locate the external detector connector on your FTIR spectrometer (please refer to the spectrometer manual for detailed information on connecting and using external detectors).

3. Connect the accessory detector with the spectrometer using the cable supplied with the X, Y Autosampler. Turn the spectrometer on.

4. Using the spectrometer software, activate the X, Y Autosampler detector.

Connecting to your Computer

Please load the AutoPRO6 software before connecting the accessory to the PC. Instructions for the AutoPRO6 software are covered in a separate manual.

Locate the USB port on top of the accessory panel. Connect the USB cable to that port and to a USB port on your computer.

Powering-Up the Accessory

Plug the DC power line connector to the matching DC power jack on the accessory panel. Connect the power supply to an AC wall outlet. The green “power on” line LED light will come-on.

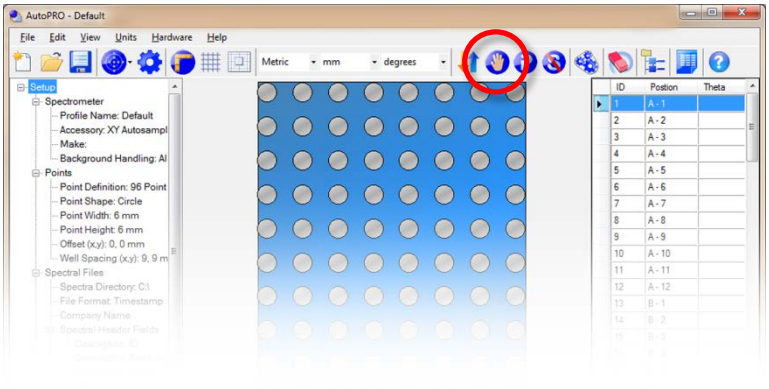
Accessory Sampling Plates

The reflectance version of the X, Y Autosampler works with a 96-well aluminum plate. The wells are 7 mm in diameter and 5 mm deep. A 1/4” pin mirror is located in the A1 position of this plate for accessory alignment. The transmission plate consists of a thin Silicon crystal with sample locations marked on the crystal surface. The A1 position is used for background collection both in reflection and transmission modes.

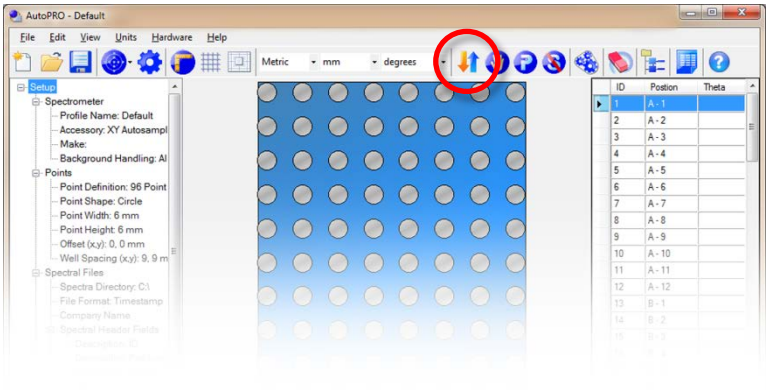
Please refer to a separate manual for AutoPRO6 Software installation and use.

Accessory Alignment

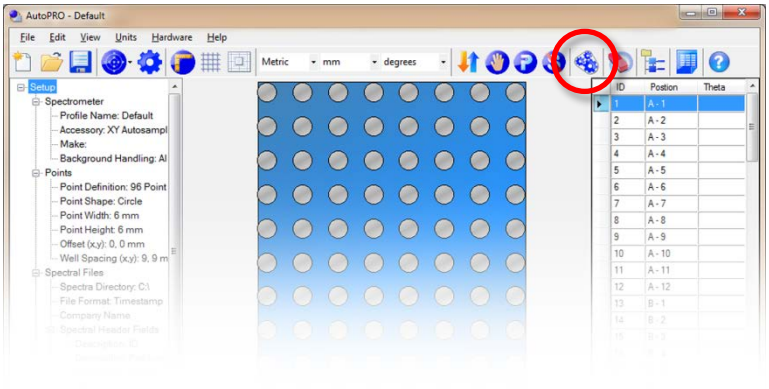
1. In AutoPRO6 software set the accessory to manual mode.



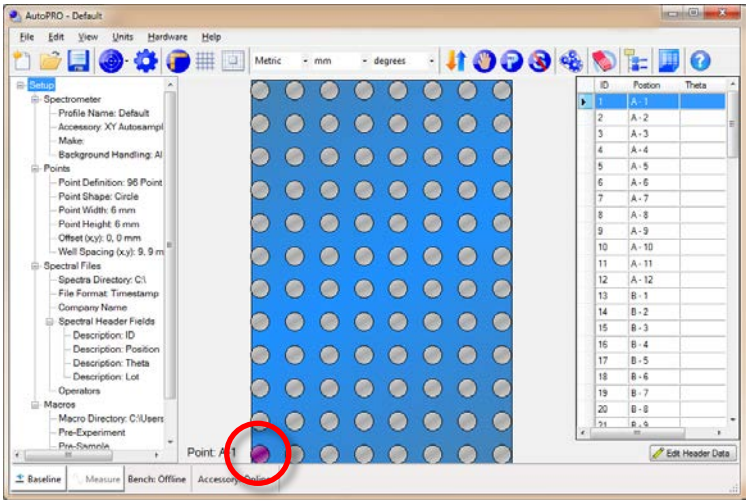
2. Load the tray for diffuse reflection measurements (this tray contains the alignment mirror in A1 position).



3. Click the Initialize Motors icon (the stage will move slightly and reposition itself at position 0,0).



4. Click A1 on the screen to move the tray to that location.



5. Start the spectrometer software and locate the energy alignment screen (live interferogram, energy indicator, ACD Count display). Maximize energy throughput by adjusting the micrometer head clockwise and/or counter-clockwise. Repeat these steps a few times until the maximum reading is obtained.

6. This alignment covers both diffuse reflection and transmission modes. For transmission measurements select the external detector in the spectrometer software and switch to the transmission sampling tray. No additional adjustments are required in the transmission mode.

7. Set up your experiment as described in the AutoPRO6 User Manual.

Precautions

Mirrors

The accessory is factory aligned and there is no need for opening the accessory cover. The mirrors used in this device are uncoated (bare) aluminum on glass substrate in order to provide the best performance in infrared range. Since the coatings are soft, care must be taken to avoid damage. Normally, these mirrors will not need cleaning as they are contained within the housing of the accessory. If they do need cleaning, use compressed air (the air needs to be clean and dry). Under no circumstances must the mirrors be rubbed with paper products such as “Kleenex” as this will scratch the mirror coating.

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